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(56) Documents Cited  
GB 2204001 A EP 0254689 A1 EP 0240470 A1  
EP 0076934 A1 US 5319840 A

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## (54) A method of assembling a motor vehicle with robotic installation of windscreen and roof

(57) The method comprises using a robotic cell C1 to place at least one window 11 on a partially assembled motor vehicle body 2,3,4 and using the same or a further robotic cell C1 or C2 to place one or more exterior closing panels 12 on the partially assembled motor vehicle body. The method is particularly useful when placing pre-painted polymeric roof panels 12 in position as manual handling thereof is minimised and the risk of handling damage is thereby reduced. An adhesive bead may be applied to the roof panel 12 by the nozzle 9 of the robotic arm 8 before the roof is placed in position.

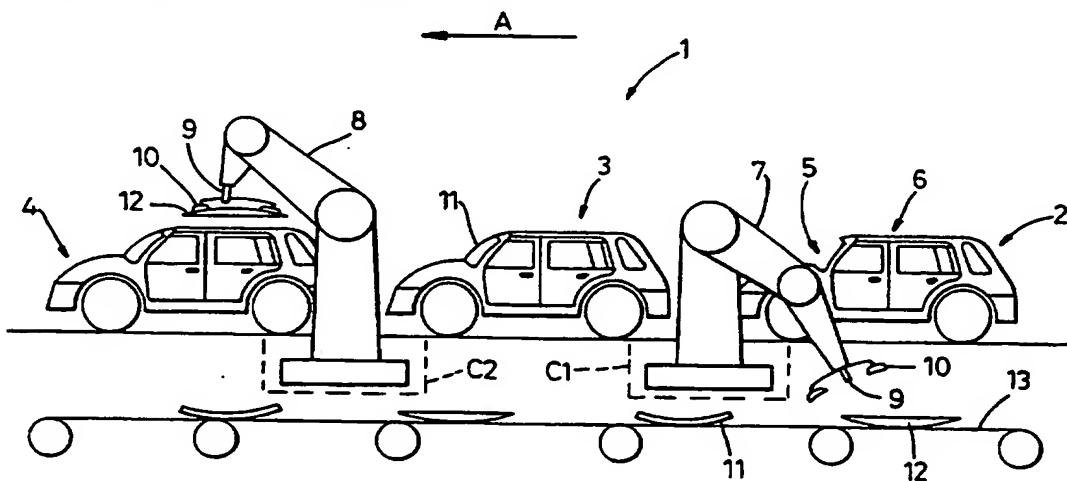


Fig. 1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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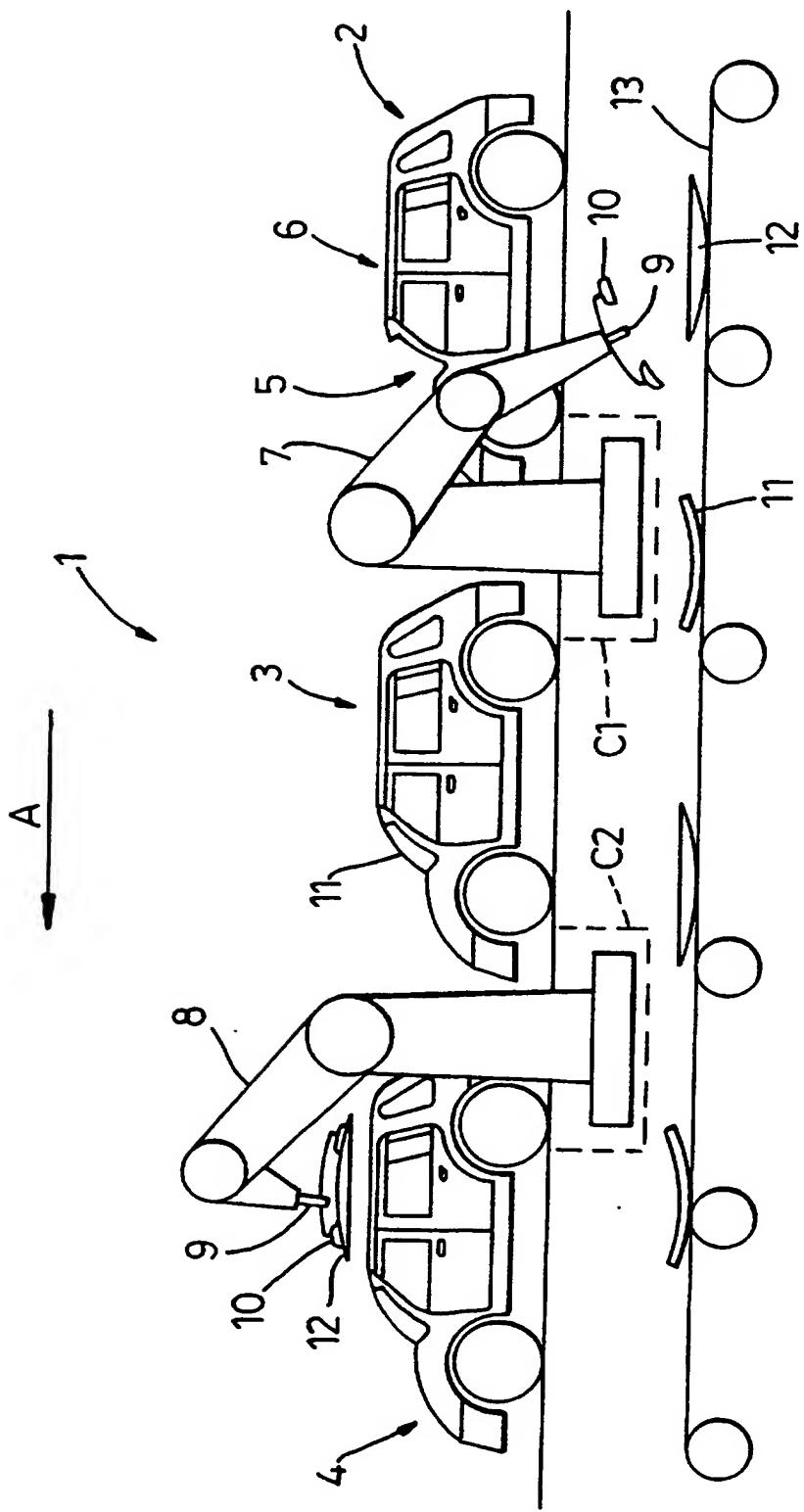


Fig. 1

A METHOD OF ASSEMBLING A MOTOR VEHICLE

The invention relates to a method of assembling a motor vehicle, using one or more robotic cells.

The use of robotics for the application of an adhesive bead to a windscreen or backlight and for the installation of such a component into a motor vehicle body aperture is known. The use of robotics has the advantage of allowing the windscreen and backlight to be accurately and consistently placed and ensures that a water tight joint is produced. Adhesive application is also accurately controlled, preventing contamination of other body parts and the use of the robotic cell reduces the risk of handling damage.

A closing panel such as a roof may be placed in position on a partly assembled vehicle body during its passage along an assembly line. Increasing use is being made of polymeric roof panels which are held in position on the vehicle body by means of an adhesive. Once in position, the roof panel becomes partly structural in that it contributes to the overall rigidity of the vehicle. Handling large closing panels during assembly on to the vehicle is difficult and an object of the present invention is to provide a method of assembly which will reduce that particular problem.

According to a first aspect of the invention there is provided a method of manufacturing a motor vehicle comprising the steps of providing a partially assembled motor vehicle body, using a robotic cell to place at least 5 one window on to the partially assembled motor vehicle body, and using the said or a further robotic cell to place an exterior closing body panel on the partially assembled motor vehicle body.

Preferably the exterior closing panel is made of a 10 polymeric material. The robotic cell used to place the exterior closing panel may apply an adhesive bead to that panel prior to placing the panel on the partly assembled motor vehicle body.

The exterior closing panel may comprise a roof panel.  
15 Preferably the method of the invention also comprises the step of supplying the or the further robotic cell with exterior closing panels for respective vehicles by means of a conveyor.

Preferably the motor vehicle is assembled on an assembly 20 line.

The invention also includes a motor vehicle manufactured by a method according to the first aspect of the invention or any of the consistency clauses relating thereto.

According to a second aspect of the invention there is provided a method of assembling a motor vehicle comprising the steps of providing a partially assembled motor vehicle body and using a robotic cell to attach one or more opaque 5 polymeric exterior closing panels to the motor vehicle.

A method of manufacturing a motor vehicle in accordance with the invention will now be described by way of example with reference to the accompanying drawing which is a schematic diagram showing part of a motor car assembly line 10 utilising an assembly method according to the invention.

A motor car assembly line 1 has a plurality of motor car bodies 2, 3, 4 thereon. The cars 2, 3, 4 on the assembly line 1 proceed in the direction of arrow A for assembly.

The first car 2 is partially assembled and defines a 15 windscreens aperture 5 and a roof aperture 6.

The figure illustrates robotic arms 7, 8 which form parts of respective robotic cells C1, C2 which include sensors and control systems (not shown) associated with each robotic arm. Adhesive applying nozzles 9 and "pick-and-20 place" jigs 10 are attached to the distal ends of the respective robotic arms 7, 8 to enable the arms to perform a variety of functions.

In the example shown, windscreens 11 and roof panels 12 are supplied to the robotic arms 7, 8 by a conveyor belt 13.

Robotic arm 7 applies adhesive to the windscreen 11 using its nozzle 9 and then, by using its pick-and-place jig 15, places the windscreen 11 in position on the first car 2.

Once the windscreen 11 has been installed as shown on 5 the second car 3, a roof panel 12 which may be made of a polymeric material, is put into place as shown on the third car 4 using the pick-and-place jig 10 on the second robotic arm 8. An adhesive bead may be applied by the nozzle 9 of the robotic arm 8 to the roof panel 12 prior to installation 10 of the roof panel on the third car 4.

In an alternative embodiment in accordance with the invention the robotic arms 7, 8 may be replaced by a single robotic arm which places both the windscreens 11 and the roof panels 12 in position on the cars. This has the 15 additional advantage that the assembly line is shortened and the number of expensive robotic cells C1, C2 needed by the assembly line is reduced.

The method of assembly in accordance with the invention facilitates the accurate and consistent placement and 20 positioning of roof panels 12 with a reliable water tight joint provided by the adhesive. By using a robotic cell to apply the roof panels 12, manual handling of the panels 12 is minimised thereby reducing handling damage particularly to roof panels which comprise large flexible painted 25 polymeric mouldings.

CLAIMS

1. A method of manufacturing a motor vehicle comprising the steps of providing a partially assembled motor vehicle body, using a robotic cell to place at least one window on the partially assembled motor vehicle body and using the said or a further robotic cell to place one or more exterior closing panels on the partially assembled motor vehicle body.
- 2 A method according to Claim 1 in which the exterior closing panel is a roof panel.
- 3 A method according to Claims 1 or 2, wherein the exterior closing panel is made of a polymeric material.
- 4 A method according to any previous claim additionally comprising the step of using the or the further robotic cell to apply an adhesive bead to the exterior closing panel prior to placing it on the partially assembled motor vehicle body.
- 5 A method according to any previous claim comprising supplying the or the further robotic cell with exterior closing panels for respective vehicles by means of a conveyor.
- 6 A method according to any preceding claim, wherein the same robotic cell is used to place both the window and

the exterior closing panel on the partially assembled motor vehicle body.

- 7 A method of manufacturing a motor vehicle substantially as hereinbefore described with reference to the accompanying drawing.
- 8 A motor vehicle manufactured by a method according to any previous claim.



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Application No: GB 9608441.3  
Claims searched: 1 to 8

Examiner: John Twin  
Date of search: 17 June 1996

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.O): B7B (BR)

Int Cl (Ed.6): B62D 65/00

Other: Online: WPI

**Documents considered to be relevant:**

| Category | Identity of document and relevant passage                           | Relevant to claims |
|----------|---|--------------------|
| X        | GB 2204001 A (Nissan) - see eg p.11, lines 9-13                     | 1-3 at least       |
| X        | EP 254689 A1 (Iveco-Fiat) - see eg col.1, line 25 to col.2, line 26 | 1-3 at least       |
| X        | EP 240470 A1 (Fiat Auto) - note assembly of roof 6, fig.1           | 1-3 at least       |
| X        | EP 76934 A1 (Fiat Auto) - see eg col.12, lines 23-29                | 1-3 at least       |
| X        | US 5319840 (Mazda) - see eg col.12, lines 14-25                     | 1,2 at least       |

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|---|---|---|--|
| X | Document indicating lack of novelty or inventive step   | A | Document indicating technological background and/or state of the art.  |
| Y | Document indicating lack of inventive step if combined with one or more other documents of same category. | P | Document published on or after the declared priority date but before the filing date of this invention.          |
| & | Member of the same patent family  | E | Patent document published on or after, but with priority date earlier than, the filing date of this application. |

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